LEVEL II

SUSQUEHANNA RIVER BASIN

WEST BRANCH OF LACKAWANNA RIVER, SUSQUEHANNA COUNTY

PENNSYLVANIA

HATHAWAY POND DAM

NDI No. PA 00050

PennDER No. 58-06

Dam Owner: Versland and Associates, Inc.

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

DACW31-81-C-0011

prepared for

DEPARTMENT OF THE ARMY

Baltimore District, Corps of Engineers

Baltimore, Maryland 21203

prepared by

MICHAEL BAKER, JR., INC.

Consulting Engineers

4301 Dutch Ridge Road

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June 1981

PREFACE

This report is prepared under guidance contained in the "Recommended Guidelines for Safety Inspection of Dams," for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

Hathaway Pond Dam, Susquehanna County, Pennsylvania
NDI No. PA 00050, PennDER No. 58-06
West Branch of Lackawanna River
Inspected 30 October 1980

ASSESSMENT OF GENERAL CONDITIONS

Hathaway Pond Dam is owned by Versland and Associates, Inc., and is classified as a "Significant" hazard - "Small" size dam. The dam was found to be in poor overall condition at the time of inspection.

Hydraulic/hydrologic evaluations, performed in accordance with procedures established by the Baltimore District Corps of Engineers for Phase I Inspection Reports, revealed that the spillway capacity is less than the peak inflow to the impoundment during the 100-year flood. A spillway design flood (SDF) in the range of the 100-year flood to the 1/2 Probable Maximum Flood (1/2 PMF) is required for Hathaway Pond Dam. Because the dam is on the low end of the "Small" size category in terms of storage capacity, the 100-year flood was chosen as the SDF. The spillway is therefore considered "Inadequate." It is recommended that the owner develop remedial measures to ensure that the dam will not be overtopped by the 100-year flood.

The inspection and review of available information revealed certain items of work which should be performed without delay by the owner. These include:

(1) Develop remedial measures to ensure that the dam is not overtopped by the 100-year flood.

(2) Cut all brush and trees at ground level over the entire dam. All trees with a trunk diameter greater than 3 inches should have their root systems removed, and all resultant cavities should be filled, compacted, and seeded.

(3) Repair the wood sheet piling on the upstream face of the dam.

(4) Monitor the seep near the toe of the dam at regular intervals and during periods of high reservoir levels for turbidity and/or increase in flow, which may indicate the potential for the piping of

embankment material. If turbidity or increased flows are noted, a qualified geotechnical engineering firm is to be retained to perform a stability check of the dam and develop remedial measures.

5) Investigate the 8-inch cast iron outlet pipe, and ensure that it is returned to an operable condition or is properly plugged. If the pipe is not made operable, alternative draw down provisions should be made. Also a means of upstream closure should be provided for any pipe through the embankment.

6) Repair the left spillway training wall.

7) Repair the spillway discharge apron, and remove the brush and debris from the apron.

8) Repair the bridge over the spillway.

9) Outlet channel should be graded such that it no longer flows along the toe of the dam.

In addition, the following operational measures are recommended to be undertaken by the owner:

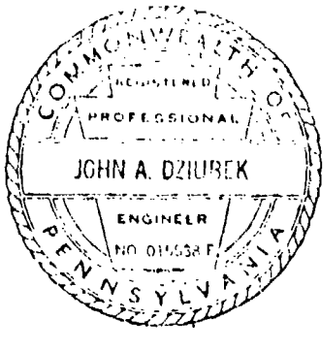
1) Develop a detailed emergency operation and warning system.

2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.

3) When warning of a storm of major proportions is given by the National Weather Service, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. These should be included in a formal maintenance and operations manual for the dam.

HATHAWAY POND DAM



Submitted by:

MICHAEL BAKER, JR., INC.

John A. Dziubek, P.E.
Engineering Manager-Geotechnical

Date: 26 June 1981

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
Commander and District Engineer

Date: 7 July 81

HATHAWAY POND DAM

Overall View of Left Upstream Side of Dam and Spillway

Overall View of Right Upstream Side of Dam

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
HATHAWAY POND DAM
NDI No. PA 00050, PennDER No. 58-06

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority - The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose of Inspection - The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT -

a. Description of Dam and Appurtenances - Hathaway Pond Dam is a dry masonry earthfill embankment 160 feet long and 13.3 feet high. It has an average crest elevation of 1949.0 feet M.S.L. and a crest width of 22 feet. The downstream face of the embankment is a vertical dry-laid masonry wall 15 feet high. Wooden sheet piling, which is 2 inches thick, extends along the upstream crest of the dam. Approximately 5 feet of this piling is exposed. The upstream face of the dam slopes away from the base of the piling at a slope of approximately 6H:1V (Horizontal to Vertical).

The spillway, located on the left side of the embankment, is a rectangular channel lined with 2-inch wooden plank sheeting. The spillway is 28 feet wide, perpendicular to the water flow. The spillway crest has a breadth of 8 feet, parallel to the flow, and has a crest elevation of 1945.0 feet M.S.L. which is approximately 4 feet below the crest of the dam. The spillway has cemented masonry training walls extending to the dam crest. Water flows through the 8-foot wide rectangular channel, drops 1.5 feet, then flows over another 10 feet of wooden planking before dropping 6 feet to the discharge channel. A wooden bridge carries a farm road over the spillway. The underside of the bridge is 3.8 feet higher than the spillway crest.

Although there is no record of any outlet works in the available information, what appears to be an outlet in the form of an 8-inch cast iron pipe is located in the downstream wall of the embankment. However, no intake works or any record of the facility was found.

b. Location - Hathaway Pond Dam is located in Ararat Township, Susquehanna County, Pennsylvania. The dam is located on the west branch of the Lackawanna River about 2 miles south of Ararat, Pennsylvania. The coordinates of the dam are N 41° 48.2' and W 75° 31'. The dam and reservoir are shown on USGS 7.5 minute topographic quadrangle, Thompson, Pennsylvania.

c. Size Classification - The height of the dam is 13.3 feet. The reservoir volume to the minimum top of the dam at elevation 1948.9 feet M.S.L. is 251 acre-feet. Therefore, the dam is in the "Small" size category.

d. Hazard Classification - Two houses, one trailer and a road are located about 1800 feet downstream of the dam. These structures range from 5 feet to approximately 10 feet above the streambed. There would be economic damage to these structures and road if the dam were to fail; however, no loss of life is believed likely to occur. Therefore, Hathaway Pond Dam is considered to be in the "Significant" hazard category.

e. Ownership - According to Susquehanna County tax records, the dam is owned by Versland and Associates, Inc., c/o Robert Hotesblatt, 42-44 North Main Street, Spring Valley, N.J. 10977. Attempts to contact the owner have resulted in no response.

f. Purpose of Dam - The reservoir was originally created to provide water for power purposes. It was later used as a water source for the railroad industry and ice harvesting. It is now used for recreational purposes.

g. Design and Construction History - The dam was probably built during the latter half of the 1800's, but the engineer, builder, and exact date of construction are unknown. The Jefferson Railroad Company submitted plans, applied for, and received a permit to make repairs and improvements to the dam on 12 November 1914. After some revisions and alterations to the plans, the construction work was completed in the fall of 1917.

h. Normal Operational Procedures - The reservoir is typically maintained near the spillway crest elevation of 1945.0 feet M.S.L.

1.3 PERTINENT DATA

a. Drainage Area (square miles) - 1.92

b. Discharge at Dam Site (c.f.s.)

Maximum Flood -	Unknown
Spillway Capacity - (at Pool El. 1948.9 ft. M.S.L.)	667.0

c. Elevation (feet above Mean Sea Level [ft. M.S.L.])* -

Design Top of Dam -	Unknown
Minimum Top of Dam -	1948.9
Average Top of Dam -	1949.0
Maximum Design Pool -	Unknown
Spillway Crest -	1945.0
Streambed at Toe of Dam -	1935.6
Maximum Tailwater of Record -	Unknown

d. Reservoir (feet)

Length of Normal Pool -	1900.0
Length of Maximum Pool -	2100.0

e. Storage (acre-feet)

Top of Dam (El. 1948.9 ft. M.S.L.) -	251.0
Normal Pool (El. 1945.0 ft. M.S.L.) -	145.0

f. Reservoir Surface (acres) -

Top of Dam (El. 1948.9 ft. M.S.L.) -	27.4
Normal Pool (El. 1945.0 ft. M.S.L.) -	24.5

g. Dam -

Type - Dry masonry earthfill.	
Total Length Including Spillway (feet)-	160.0
Maximum Height (feet) Design -	16.0
Field -	13.3

*All elevations are referenced to the spillway crest, Elevation 1945.0 ft. M.S.L. as estimated from the USGS 7.5 minute topographic quadrangle, Thompson, Pennsylvania. Elevations shown on Plate 5 were based on some other datum.

Top Width (feet) - 22.0
Side Slopes - Upstream - Vertical (wooden sheet piling 5-ft. high) then 6H:1V
Downstream - Vertical (dry laid masonry wall)
Zoning - None
Impervious Core - None
Cutoff - None
Drains - None

h. Diversion and Regulating Tunnel - None

i. Spillway -

Type - Broad crested weir, lined with 2-inch planking on bottom
Location - Left side of embankment
Length of Crest Perpendicular to Flow (feet) - 28.0
Crest Elevation (ft. M.S.L.) - 1945.0
Gates - None
Downstream Channel - The downstream channel is obstructed with vegetation and debris.

j. Outlet Works - 8-inch cast iron pipe to the right of the spillway. (Note: The operability of these outlet works is questionable).

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The information reviewed for preparation of this report was the Pennsylvania Department of Environmental Resources' (PennDER) File No. 58-06. This included:

1) A letter from the President of Scranton Bolt and Nut Company expressing fears about the dam's safety on 8 April 1913.

2) Dam Permit Application Report and plans filed by The Jefferson Railroad Company on 9 September 1914 to the Water Supply Commission of Pennsylvania for permission to repair the dam.

3) Application approval from the Water Supply Commission on 12 November 1914.

4) Correspondence explaining delays in implementing and revisions to the plans.

5) Inspection and semi-monthly progress reports made during the reconstruction of the dam.

6) Post construction inspection report performed on 26 November 1917.

7) Inspection reports from 1913 through 1964 and various correspondence about these reports. The first recorded inspection was made on 19 April 1913 by the Water Supply Commission of Pennsylvania. The latest recorded inspection, conducted by PennDER on 22 September 1964, found the dam to be in good condition with no maintenance action required.

The design drawings for repairs to the dam are reproduced and presented as Plate 3.

2.2 CONSTRUCTION

The original dam was probably built in the last half of the 1800's. Both the Contractor and Engineer are unknown. Reconstruction and repairs to the dam were made in July, August, and September of 1917 by the owner, the Jefferson Railroad Company. Since that time, no further construction work has been performed.

2.3 OPERATION

No formal records are available for operation of the dam and reservoir. The reservoir is typically maintained at the spillway crest and does not fluctuate much from this level.

2.4 EVALUATION

a. Availability - The information used is readily available from PennDER's File No. 58-06.

b. Adequacy - The information available with the visual inspection measurements and observations are adequate for a Phase I Inspection of this dam.

c. Validity - There is no indication at the present time to doubt the validty of the available engineering data.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General - The dam was found to be in poor overall condition at the time of inspection on 30 October 1980. No unusual weather conditions were experienced during the inspection. Noteworthy deficiencies observed during the visual inspection are described briefly in the following paragraphs. The complete visual inspection checklist, field sketch, top of dam profile, and typical cross-section are given in Appendix A.

b. Dam - The entire embankment is covered with trees and brush. The wood sheet piling on the upstream face of the dam is deteriorated. A seep is located approximately 50 feet to the right of the spillway near the toe of the dam.

c. Appurtenant Structures - The outlet of an 8-inch cast iron pipe was found at the downstream toe of the dam. No valve or inlet for the pipe could be located; therefore, the operation of this pipe as an outlet is questionable. The spillway has a deteriorated wooden discharge apron that is clogged with dead branches and brush. The left masonry training wall has collapsed into the discharge apron. The wooden bridge over the spillway is deteriorated, and its left end is lacking any structural foundation as it was supported by the training walls.

d. Reservoir Area - The reservoir slopes are moderate with a good cover of vegetation. There are three ponds upstream from Hathaway Pond Dam on two tributary streams. The western stream contains Romobe Lake (PennDER I.D. No. 58-10) which is 1750 feet upstream from Hathaway Pond Dam. The eastern tributary contains Ball Lake and an unnamed smaller pond in series. Ball Lake is 2450 feet upstream and will retain considerable storage while the smaller unnamed pond was considered to have no effect on Hathaway Pond Dam.

e. Downstream Channel - Two homes, a trailer, and township road are located 1800 feet downstream from Hathaway Pond Dam. These could suffer economic damage in the event of a dam failure.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no formal written instructions for operating the reservoir or evacuating the downstream area in case of an impending emergency. It is recommended that formal emergency procedures be adopted, prominently displayed, and furnished to all operating personnel.

4.2 MAINTENANCE OF DAM

There are no formal records of maintenance or formal procedures for evaluating the necessity of maintenance for the structure. It is recommended that formal inspection procedures be developed.

4.3 MAINTENANCE OF OPERATING FACILITIES

There is no record of any operating facilities installed in the dam. An 8-inch cast iron pipe exiting on the downstream slope of the dam does appear to be some type of outlet but is probably clogged, damaged, and unable to be restored to an operational condition without major repairs. An emergency drawdown plan should be developed in case there is a need to dewater the reservoir.

4.4 DESCRIPTION OF ANY WARNING SYSTEM

There is no warning system in the event of dam failure. It is recommended that an emergency warning system should be developed.

4.5 EVALUATION OF OPERATIONAL ADEQUACY

A formal maintenance and operations manual including drawdown provisions should be prepared for the dam.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

A. Design Data - No hydraulic or hydrologic design calculations are available for Hathaway Pond Dam.

b. Experience Data - No information concerning the effects of significant floods on the dam is available.

c. Visual Observations - The spillway is obstructed with branches and debris from the lake. The cemented masonry left training wall is collapsing into the spillway, thereby reducing its capacity. The top of the dam is uniform with no low areas.

Romobe Lake (NDI No. PA 00511) is 1750 feet upstream from Hathaway Pond. The dam is an 8-foot high masonry and rock fill dam, 74 feet long with a grass-lined, trapezoidal spillway.

Ball Lake is 2450 feet upstream on another tributary to Hathaway Pond. The dam is a 70-foot long, 5-foot high earthfill embankment with no well-defined spillway.

d. Overtopping Potential - Hathaway Pond Dam is a "Small" size - "Significant" hazard dam requiring evaluation for a spillway design flood (SDF) in the range of the 100-year flood to the 1/2 Probable Maximum Flood (1/2 PMF). Because the dam is on the low end of the "Small" size category in terms of height and storage capacity, the 100-year flood was chosen as the SDF.

Using material from "The Hydrologic Study - Tropical Storm Agnes" prepared by the Corps of Engineers in New York City, the peak inflow to the impoundment for the 100-year flood was calculated to be 1456 c.f.s. The peak inflow to the impoundment for the 100-year flood was also calculated to be 1440 c.f.s. using material from "Water Resources Bulletin, Bulletin No. 13, Floods in Pennsylvania", prepared by the Department of Environmental Resources, Commonwealth of Pennsylvania. Averaging these two methods produced a peak inflow of 1448 c.f.s. which was used in this analysis.

The spillway capacity at the minimum top of the dam is 667 c.f.s. which is approximately 46 percent of the peak inflow to the impoundment.

e. Spillway Adequacy - As outlined in the above analysis, the inflow to the impoundment during the 100-year flood is greater than spillway capacity; therefore, the spillway is considered "Inadequate".

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations - There were no structural inadequacies noted during the visual inspection that cause concern for the structural stability of the dam.

b. Design and Construction Data - No design or construction data were available for review. Generally for this type of dam, if the ratio of the width to height of the stonewall portion of the dam is 0.5 (w/h), the stability of the dam due to overturning or sliding is not a problem. (Reference "Evaluation and Repair of Stonewall-earth Dams," by Kent A. Healy, Proceedings of "Safety of Small Dams," New England College, Henniker, New Hampshire, August 4-9, 1974, pp. 149-178.) The w/h ratio for this dam is slightly greater than 0.5, as best as can be determined from the design plans, and no sign of instability was observed during the visual inspection. Therefore, further assessments of the structural stability are not considered necessary.

c. Operating Records - No operating records are available. Nothing in the procedures described by the owner's representative indicates concern for the structural stability of the dam.

d. Post-Construction Changes - No changes adversely affecting the structural stability of the dam have been performed.

e. Seismic Stability - The dam is located in Seismic Zone 1 of the "Seismic Zone Map of the Contiguous United States," Figure 1, page D-30, "Recommended Guidelines for Safety Inspection of Dams." This is a zone of minor seismic activity; therefore, further consideration of the seismic stability is not warranted.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety - Hathaway Pond Dam was found to be in poor overall condition at the time of inspection. Hathaway Pond Dam is a "Significant" hazard - "Small" size dam requiring a spillway capacity in the range of the 100-year flood to the 1/2 PMF. Because the dam is on the low end of the "Small" size category in terms of storage capacity, the 100-year flood was chosen as the SDF. As presented in Section 5, the spillway capacity is less than the peak inflow to the impoundment during the 100-year flood. Therefore, the spillway is considered "Inadequate."

b. Adequacy of Information - The information available and the observations made during the visual inspection are considered sufficient for a Phase I Inspection Report.

c. Urgency - The owner should immediately initiate the further evaluation discussed in paragraph 7.1.d.

d. Necessity for Additional Data/Evaluation - The hydraulic/hydrologic analysis performed in connection with this Phase I Inspection Report has indicated the need for additional spillway capacity.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection revealed certain items of remedial work which should be performed by the owner without delay. These include:

1) Develop remedial measures to ensure that the dam will not be overtopped by the 100-year flood.

2) Cut the brush and trees at ground level over the entire dam. All trees with a trunk diameter greater than 3 inches should have their root systems removed, and all resultant cavities should be filled, compacted, and seeded.

3) Repair the wood sheet piling on the upstream face of the dam.

4) Monitor the seep near the toe of the dam at regular intervals and during periods of high reservoir levels for turbidity and/or increase in flow, which may indicate the potential for the piping of embankment material. If turbidity or increased flows are noted, a qualified geotechnical engineering firm is to be retained to perform a stability check of the dam and to develop remedial measures.

5) Investigate the 8-inch cast iron outlet pipe, and ensure that it is returned to an operable condition or is properly plugged. If the pipe is not made operable, alternative draw down provisions should be made. Also a means of upstream closure should be provided for any pipe through the embankment.

6) Repair the left spillway training wall.

7) Repair the spillway discharge apron and remove the brush and debris from the apron.

8) Repair the bridge over the spillway.

9) Outlet channel should be graded such that it no longer flows along the toe of the dam.

In addition, the following operational measures are recommended to be undertaken by the owner:

1) Develop a detailed emergency operation and warning system.

2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.

3) When warning of a storm of major proportions is given by the National Weather Service, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. These should be included in a formal maintenance and operations manual for the dam.

APPENDIX A

VISUAL INSPECTION CHECK LIST, FIELD SKETCH, TOP OF DAM PROFILE, AND TYPICAL CROSS-SECTION

Check List
Visual Inspection
Phase 1

Name of Dam Hathaway Pond Dam County Susquehanna State Pennsylvania Coordinates Lat. N 41° 48.2'

NDI #PA00050
PennDER #58-06

Long. W 75° 30.9'

Date of Inspection 30 October 1980 Weather Overcast Temperature 40° F.

Pool Elevation at Time of Inspection 1944.41 ft.* M.S.L. Tailwater at Time of Inspection 1936.5 ft.* M.S.L.

*All elevations referenced to assumed spillway crest elevation 1945.00 ft. M.S.L. from USGS 7.5 minute topographic quadrangle, Thompson, Pennsylvania.

Inspection Personnel:

Michael Baker, Jr., Inc.:

James G. Ulinski
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Owner's Representatives:

James G. Ulinski Recorder

CONCRETE/MASONRY DAMS

Name of Dam: HATHAWAY POND DAM
NDI #PA00050

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
LEAKAGE	Seep is located approximately 50 ft. to the right of the spillway	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Good condition	
DRAINS	None	
WATER PASSAGES	Not applicable	
FOUNDATION	No problems observed	

CONCRETE/MASONRY DAMS

Name of Dam: HATHAWAY POND DAM
NDI #PA00050

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	None observed	
STRUCTURAL CRACKING	None observed	
VERTICAL AND HORIZONTAL ALIGNMENT	Good condition	
MONOLITH JOINTS	Not applicable	
CONSTRUCTION JOINTS	Not applicable	
VEGETATION	Trees and brush are growing over the entire dam.	Cut the brush and trees on the entire dam and for 10 ft. beyond the toe of the dam. Remove the root systems of all trees with a trunk diameter greater than three inches, fill, compact, and seed all resultant cavities.

EMBANKMENT N/A

Name of Dam HATHAWAY POND DAM
NDI #PA00050

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS		
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE		
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES		

EMBANKMENT N/A

Name of Dam HATHAWAY POND DAM
NDI #PA00050

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST		
RIPRAP FAILURES		

EMBANKMENT N/A

Name of Dam HATHAWAY POND DAM
NDI #PA00050

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM		
ANY NOTICEABLE SEEPAGE		
STAFF GAGE AND RECORDER		
DRAINS		

OUTLET WORKS

Name of Dam: HATHAWAY POND DAM
NDI #PA00050

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None	
INTAKE STRUCTURE	Could not be located	
OUTLET STRUCTURE	Eight in. cast iron outlet pipe	No valve or intake structure could be located and it is not known if the outlet pipe is operable.
OUTLET CHANNEL	No problems	
EMERGENCY GATE	No gate valve for the outlet pipe could be located.	Investigate the operating condition of the outlet pipe and assure its operability. If it cannot be restored to operable condition, an emergency drawdown plan should be prepared.

UNGATED SPILLWAY

Name of Dam: HATHAWAY POND DAM
NDI #PA00050

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Rectangular channel spillway is lined with wooden plank sheeting. The sheeting is deteriorated, and debris has collected on the downstream end of the channel.	Replace the sheeting in the spillway and clear debris from the channel.
APPROACH CHANNEL	Good condition	
DISCHARGE CHANNEL	Good condition	
BRIDGE AND PIERS	Bridge over the spillway is in a very deteriorated condition.	Replace bridge.

GATED SPILLWAY N/A

Name of Dam: HATHAWAY POND DAM
NDI #PA00050

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL		
APPROACH CHANNEL		
DISCHARGE CHANNEL		
BRIDGE AND PIERS		
GATES AND OPERATION EQUIPMENT		

INSTRUMENTATION

Name of Dam: HATHAWAY POND DAM
NDI #PA00050

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed	
OBSERVATION WELLS	None observed	
WEIRS	None observed	
PIEZOMETERS	None observed	
OTHER	None	

RESERVOIR

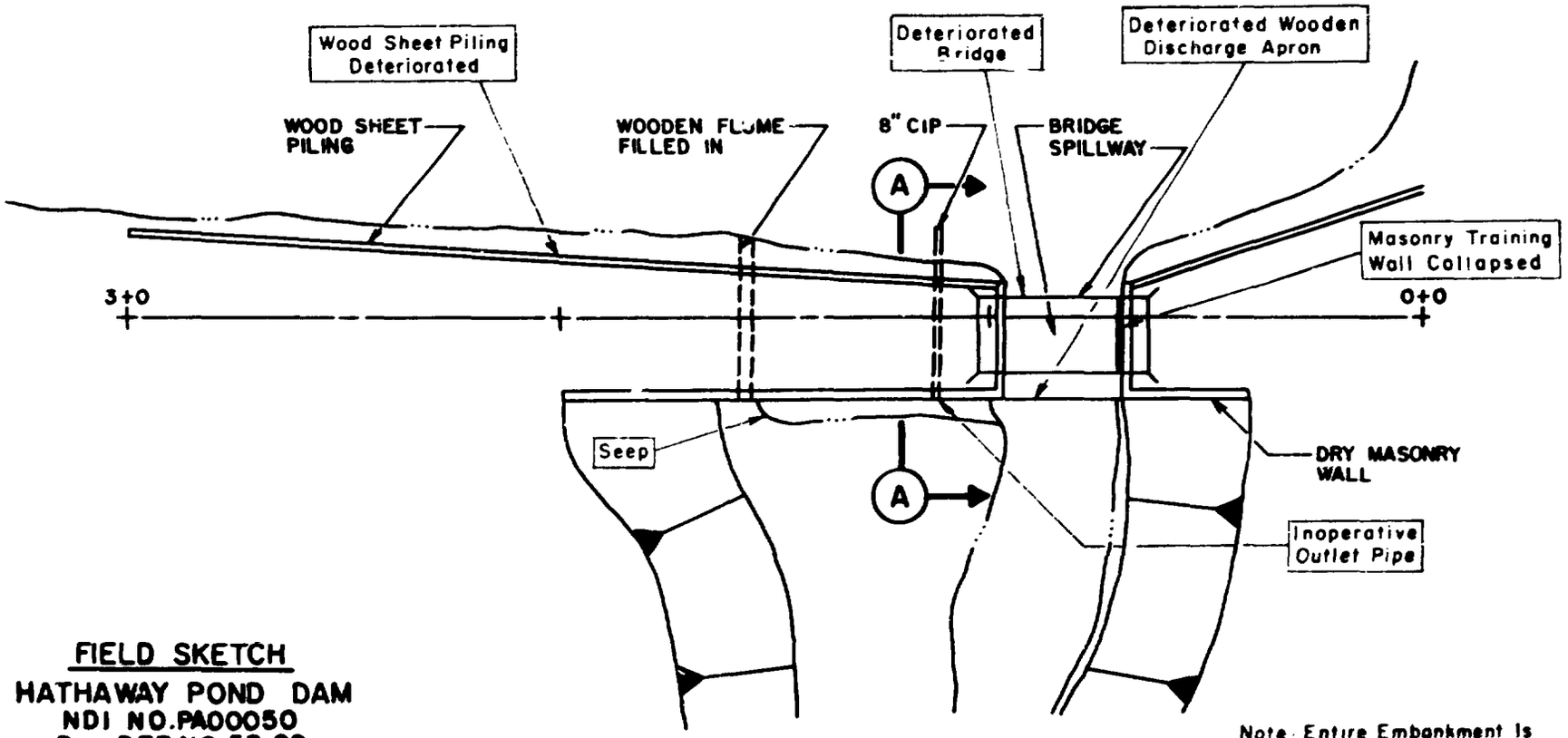
Name of Dam: HATHAWAY POND DAM
NDI #PA00050

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir slopes are moderate (5° - 15°) and forested.	
SEDIMENTATION	There is no evidence that sedimentation is a significant problem in the reservoir.	
UPSTREAM DAMS	Romobe Lake (PennDER ID #58-10) is located 1750 feet upstream. Two additional ponds (in series) located on another tributary are upstream. Ball Lake, the larger of the two, was considered to have an effect on Hathaway Pond Dam, while the smaller unnamed pond was not considered to have an effect on Hathaway Pond Dam.	

DOWNSTREAM CHANNEL

Name of Dam: HATHAWAY POND DAM
NDI #PA00050

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel is obstructed with vegetation and debris.	Clear vegetation and debris.
SLOPES	The downstream channel has a slope of approximately 2 percent to the downstream damage area and a 1 percent to 2 percent slope beyond.	
APPROXIMATE NO. OF HOMES AND POPULATION	Damage is likely to occur to two homes, a trailer, and a township road located 1800 ft. downstream of Hathaway Pond Dam.	



FIELD SKETCH

HATHAWAY POND DAM
NDI NO.PA00050
PennDER NO.58-06
SCHEMATIC - NOT TO SCALE

Note: Entire Embankment Is Covered With Brush And Trees

CROSS SECTION TAKEN AT STA.1+20

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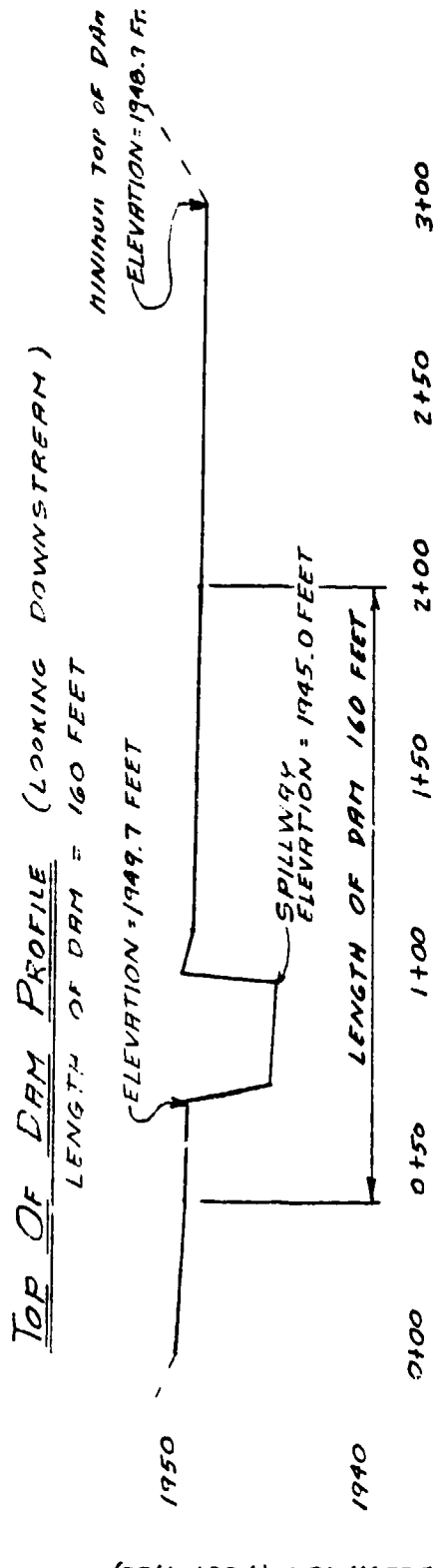
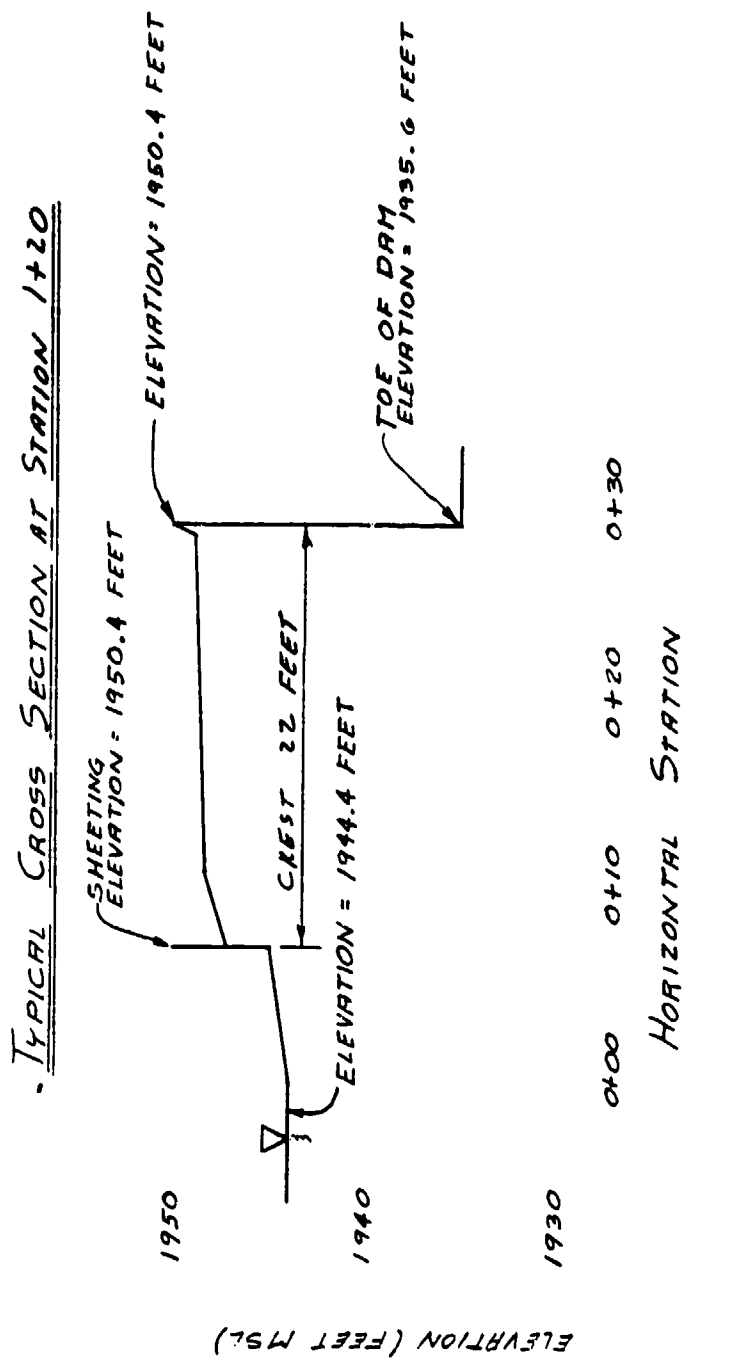
Box 280
Beaver, Pa. 15009

HATHAWAY POND DAM

TOP OF DAM PROFILE
TYPICAL CROSS-SECTION

DATE OF INSPECTION: 30 October 1980





APPENDIX B

ENGINEERING DATA CHECK LIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

Name of Dam: HATHAWAY POND DAM
NDI #PA00050

ITEM	REMARKS
PLAN OF DAM	None available (See Appendix E - Plate 3 for field sketch).
REGIONAL VICINITY MAP	A USGS 7.5 minute topographic quadrangle of Thompson, Pennsylvania, was used to prepare the vicinity map enclosed in this report as the Location Plan (Appendix E - Plate 1).
CONSTRUCTION HISTORY	The dam was probably built during the last half of the 1800's. The exact date of construction, the original designer, and the contractor are unknown. The Jefferson Railroad Company repaired and reconstructed the dam in 1917 to specifications approved by the Water Supply Commission of Pennsylvania.
TYPICAL SECTIONS OF DAM	None available (See Appendix E - Plate 4 for inspection Cross Section).
HYDROLOGIC/HYDRAULIC DATA	No information available
OUTLETS - PLAN	No information available
- DETAILS	No information available
- CONSTRAINTS	No information available
- DISCHARGE RATINGS	No information available
RAINFALL/RESERVOIR RECORDS	None available

Name of Dam: HATHAWAY POND DAM
NDI #PA00050

ITEM	REMARKS
DESIGN REPORTS	None available
GEOLOGY REPORTS	No geology reports are available for the dam (see Appendix F for the regional geology).
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	No design computations are available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available
POST-CONSTRUCTION SURVEYS OF DAM	None performed
BORROW SOURCES	No information available

Name of Dam: HATHAWAY POND DAM
NDI # PA00050

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	In October of 1914, plans were submitted to the Water Supply Commission of Pennsylvania to repair and reconstruct the dam by the Jefferson Railroad Company. After some plan revisions, construction began in July, 1917, and was completed in the fall of that year.
HIGH POOL RECORDS	No information available
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Inspections were performed on 26 September 1964, 10 August 1948, 6 September 1944, 16 August 1940, 8 September 1938, 30 October 1935, 4 October 1933, 16 July 1931, 3 June 1930, 11 September 1929, 22 May 1926, 17 May 1924, 10 May 1922, 21 May 1920, 17 May 1919, 26 November 1917, 14 October 1913, and 19 April 1913. These reports are available in the PennDER file.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported in the information available.
MAINTENANCE OPERATION RECORDS	No formal maintenance records are kept.

Name of Dam: HATHAWAY POND DAM
NDI #PA00050

ITEM	REMARKS
SPILLWAY PLAN, SECTIONS, and DETAILS	No information available
OPERATING EQUIPMENT PLANS & DETAILS	No information available

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1.92 sq. mi. (Primarily forests and pastures)

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1945.0 ft. M.S.L. (145 Ac. - Ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1948.9 Ft. M.S.L. (251 Ac. - Ft.)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1948.9 Ft. M.S.L. (Minimum top of Dam)

SPILLWAY: Rectangular Channel

a. Crest Elevation 1945.0 Ft. M.S.L.
b. Type Rectangular Channel
c. Width of Crest Parallel to Flow 8 Ft.
d. Length of Crest Perpendicular to Flow 28 Ft.
e. Location Spillover Left side of embankment
f. Number and Type of Gates None

OUTLET WORKS: None operable

a. Type
b. Location
c. Entrance Inverts
d. Exit Inverts
e. Emergency Drawdown Facilities

HYDROMETEOROLOGICAL GAGES: None

a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE Unknown

APPENDIX C

PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS

DETAILED PHOTOGRAPH DESCRIPTIONS

Overall View of Dam

Top Photo (OV-T) - Overall View of Left Upstream Side of Dam and Spillway

Bottom Photo (OV-B) - Overall View of Right Upstream Side of of Dam

Photograph Location Plan

Photo 1 - View Along Crest of Dam from Left Abutment

Photo 2 - View Along Crest of Dam from Right Abutment

Photo 3 - View Along Right Upstream Face of Dam

Photo 4 - View Along Right Downstream Face of Dam

Photo 5 - View of Spillway Approach and Crest

Photo 6 - Close-up View of Spillway Crest

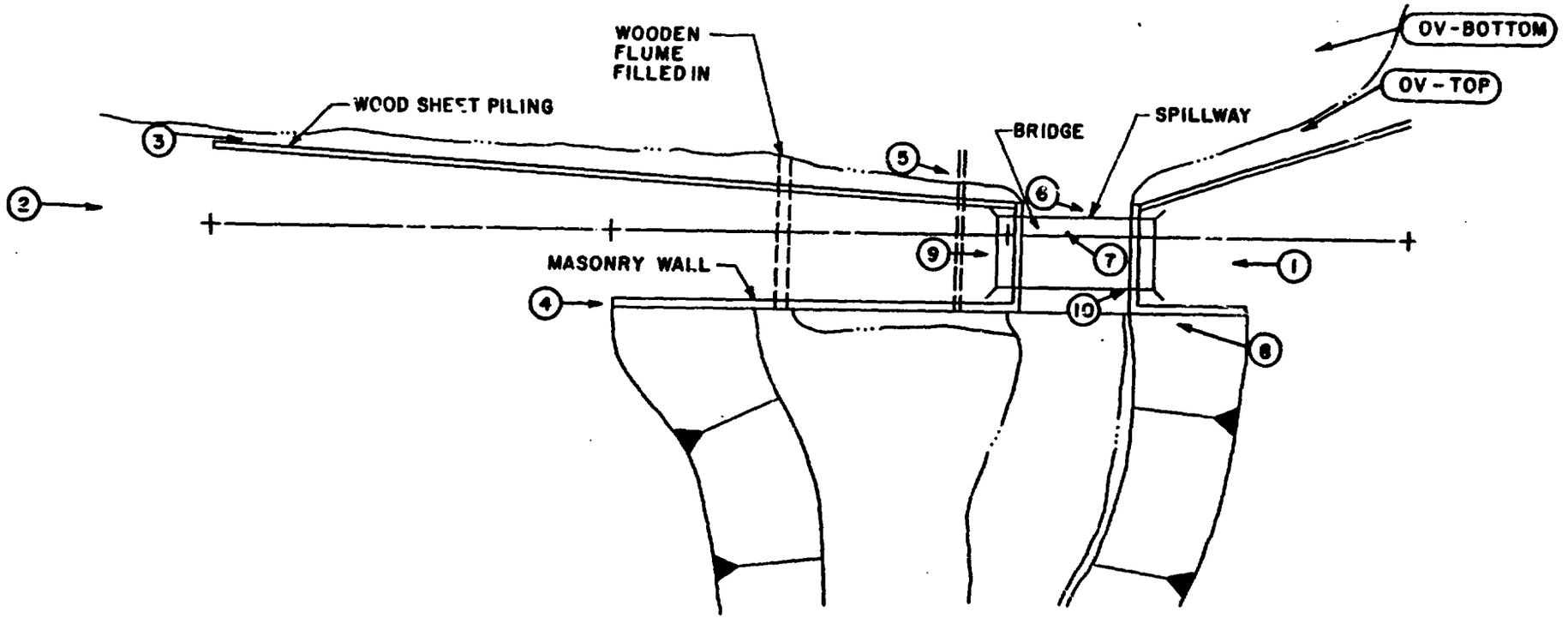
Photo 7 - View of Timber Spillway Discharge Apron

Photo 8 - View of Downstream End of Timber Spillway Discharge Apron

Photo 9 - View of Top of Wooden Bridge Across Spillway

Photo 10 - View of Collapsed Left Downstream Half of Spillway Bridge Abutment (Training Wall)

Note: Photographs were taken on 30 October 1980.



PHOTOGRAPH LOCATION PLAN

HATHAWAY POND DAM

NDI NO. PA00050

PennDER NO. 58-06

Photographs Taken 30 October 1980

HATHAWAY POND DAM

PHOTO 1. View Along Crest of Dam from Left Abutment

PHOTO 2. View Along Crest of Dam from Right Abutment

PHOTO 3. View Along Right Upstream Face of Dam

PHOTO 4. View Along Right Downstream Face of Dam

PHOTO 5. View of Spillway Approach and Crest

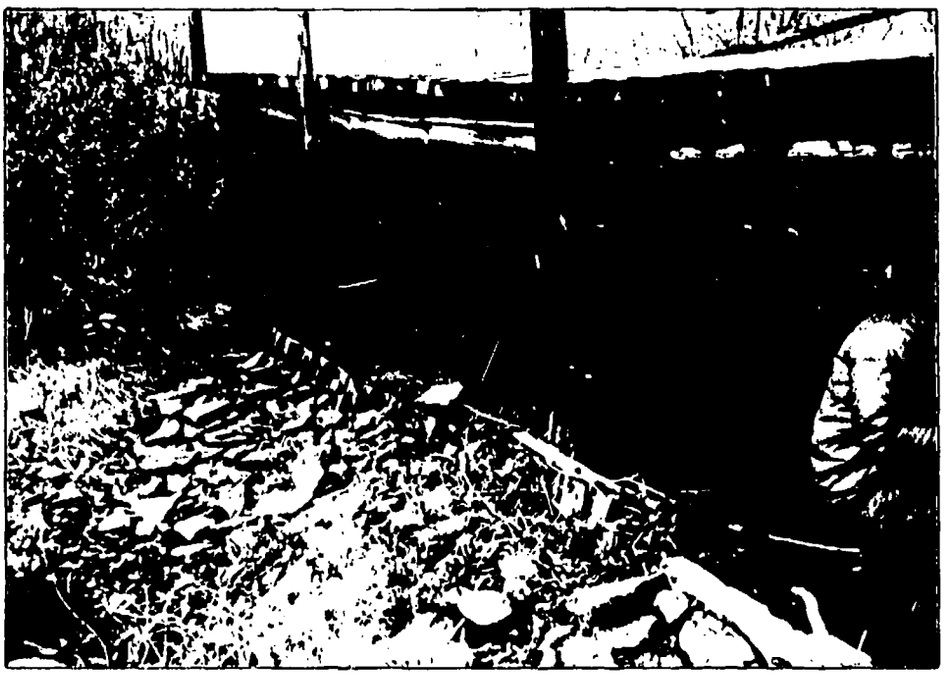


PHOTO 6. Close-up View of Spillway Crest

PHOTO 7. View of Timber Spillway Discharge Apron

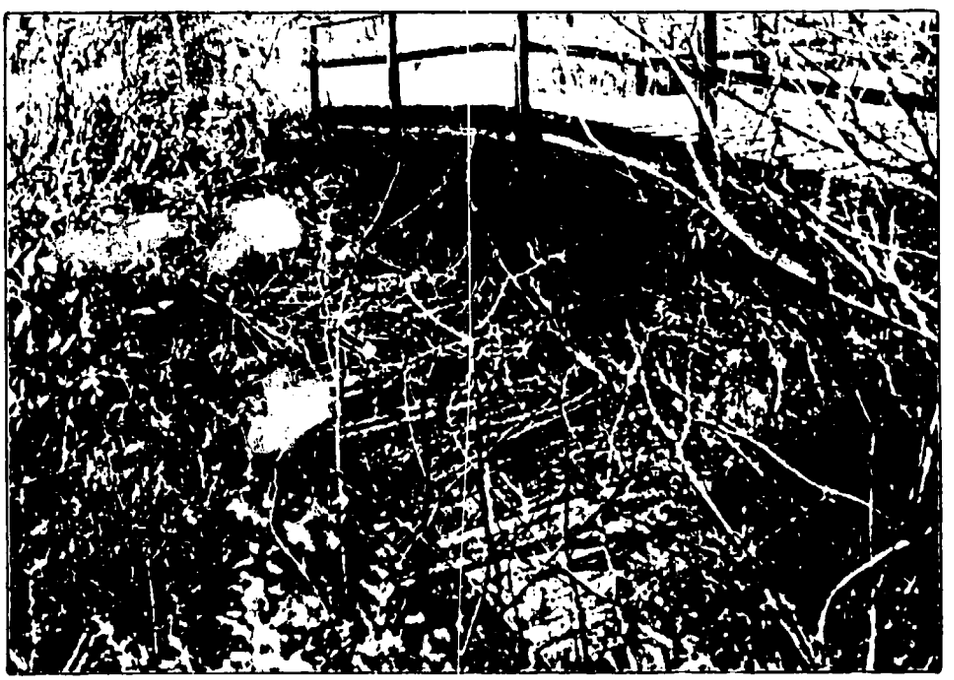


PHOTO 8. View of Downstream End of Timber Spillway Discharge Apron

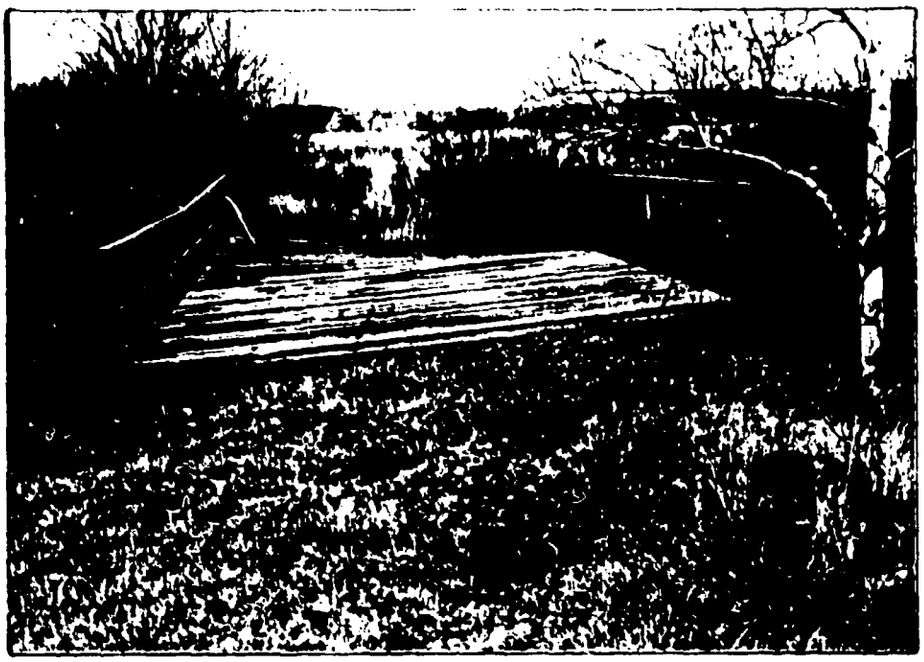


PHOTO 9. View of Top of Wooden Bridge Across Spillway

PHOTO 10. View of Collapsed Left Downstream Half of Spillway Bridge Abutment (Training Wall)

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject HATHAWAY POND DAM S.O. No.
APPENDIX D - HYDROLOGIC AND Sheet No. of
HYDRAULIC CALCULATIONS Drawing No.
Computed by Checked by Date

SUBJECT	PAGE

PREFACE

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

The hydrologic determinations presented in this Phase I Inspection Report are based on the use of a Snyder's unit hydrograph developed by the U.S. Army Corps of Engineers. Due to the limited number of gaging stations available in this hydrologic region and the wide variations of watershed slopes, the Snyder's coefficients may yield results of limited accuracy for this watershed. As directed however, a further refinement of these coefficients is beyond the scope of this Phase I Investigation.

In addition, the conclusions presented pertain to present conditions, and the effect of future development on the hydrology has not been considered.

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: HATHAWAY POND DAM

100-YEAR STORM = 6.4 INCHES/24 HOURS

STATION	1	2	3	4	5
Station Description	ROMOBE LAKE DAM	BALL LAKE	HATHAWAY POND DAM		
Drainage Area (square miles)	0.98	0.64	0.30		
Cumulative Drainage Area (square miles)	0.98	0.64	1.92		
Adjustment of PMF for Drainage Area (%)					
6 Hours					
12 Hours					
24 Hours					
48 Hours					
72 Hours					
Snyder Hydrograph Parameters					
Zone(1)	11	11	11		
C_p/C_t (2)	0.62/1.50	0.62/1.50	0.62/1.50		
L (miles)(3)	1.70	1.14	0.57		
L_{ca} (miles)(3)	0.73	0.56	0.30		
$t_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	1.60	1.31	0.88		
Spillway Data					
Crest Length (ft)	SPILLWAY	70	28.0		
Freeboard (ft)	DISCHARGE	0	2.7		
Discharge Coefficient	RATING	3.08	SPILLWAY DISCHARGE		
Exponent	ON SHEET 5	1.5	RATING ON SHEET 5		

(1) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(2) Snyder's Coefficients

(3) L = Length of longest water course from outlet to basin divide.
L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

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Beaver, Pa. 15009

Subject HATHAWAY POND DAM — S.O. No.
HYDRAULIC DATA — Sheet No. 2 of 8
Drawing No.
Computed by GWT — Checked by WDL — Date 12-24-80

STORAGE CALCULATIONS

AREA VS. ELEVATION DATA (MEASURED FROM QUADS)

ELEVATION (FT)	SURFACE AREA (ACRES)
1945	24.49
1960	49.37
1980	82.94

NORMAL POOL STORAGE

STORAGE VOLUME = $V_{NP} = h/3\,(A_1 + A_2 + \sqrt{A_1 A_2})$

h = ESTIMATED AVERAGE DEPTH = 7.6 FT.
A_1 = SURFACE AREA OF NORMAL POOL = 24.49 Ac.
A_2 = SURFACE AREA OF RESERVOIR BOTTOM = 14.14 Ac.
(ESTIMATED FROM AVERAGE DEPTH AND RESERVOIR SIDE SLOPE)

NORMAL POOL STORAGE = $V_{NP} = \frac{7.6}{3}\,(24.49 + 14.14 + \sqrt{(24.49)(14.14)})$

$V_{NP} = 145.00$ Ac.-Ft.

TOP OF DAM STORAGE

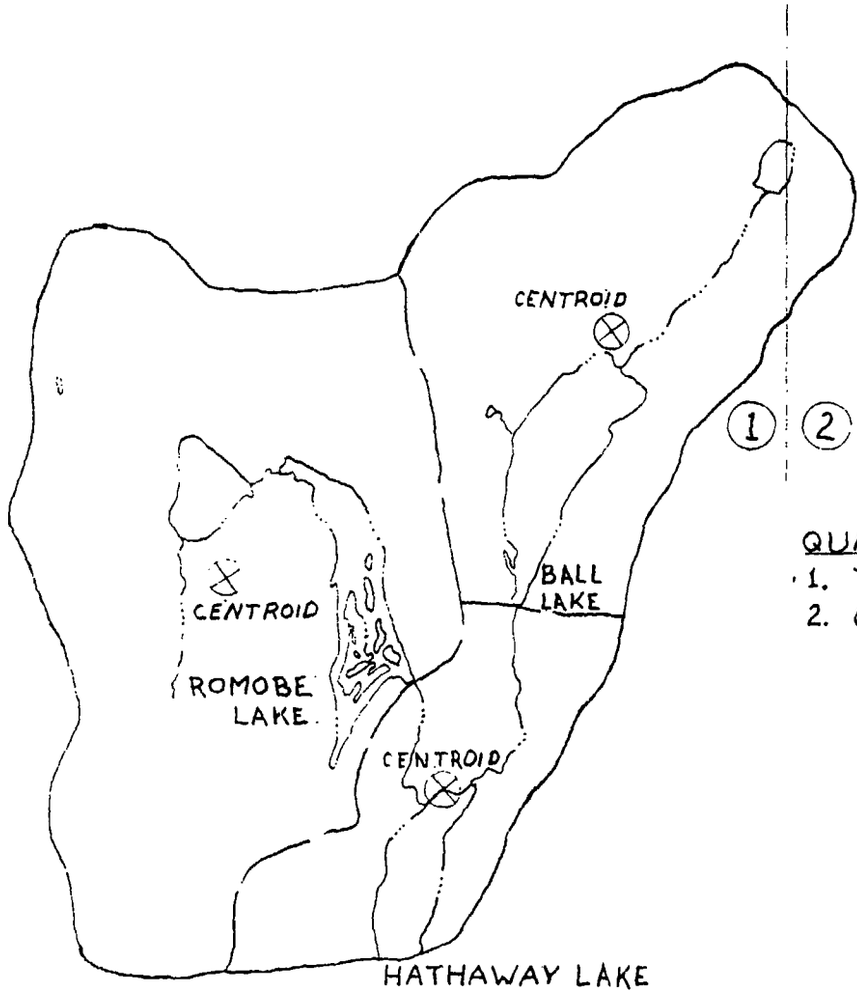
$V = h/3\,(A_1 + A_2 + \sqrt{A_1 A_2})$

$V = \frac{12.3}{3}\,(14.14 + 27.1 + \sqrt{(14.14)(27.40)})$

$V = 251.02$ Ac.-Ft.

DRAINAGE AREA ABOVE DAM

ROMOBE LAKE	0.98 Sq. Mi.
BALL LAKE	0.64 Sq. Mi.
HATHAWAY POND	0.30 Sq. Mi.
TOTAL AREA	1.92 Sq. Mi.



QUADS:
1. THOMPSON
2. ORSON

HATHAWAY LAKE DAM:
DRAINAGE AREA AND CENTROID MAP

0 2000 4000 6000

SCALE: 1" = 2000'

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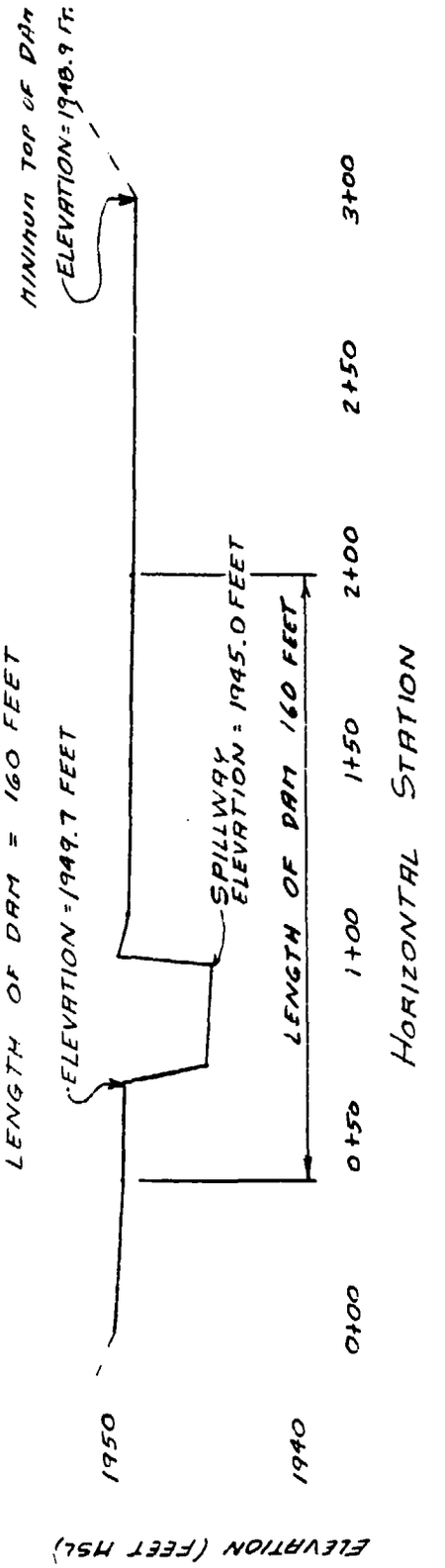
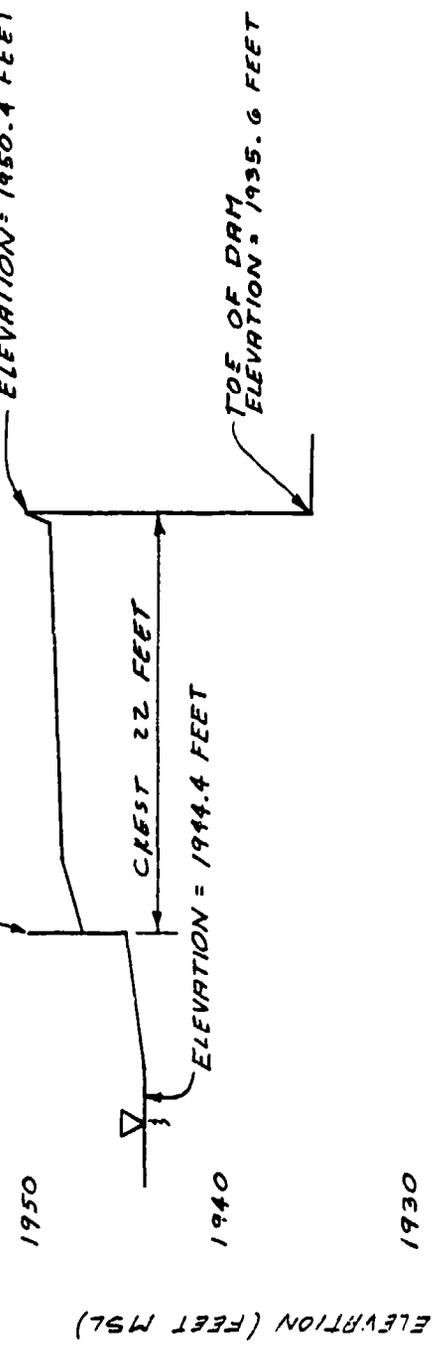
Subject HATHAWAY POND DAM — S.O. No. 13837-00-AFA-19
TOP OF DAM PROFILE — Sheet No. 4 of 23
TYPICAL CROSS SECTION — Drawing No.
Computed by GWT — Checked by WDC — Date 11-19-80

TOP OF DAM PROFILE (LOOKING DOWNSTREAM)

LENGTH OF DAM = 160 FEET



TYPICAL CROSS SECTION AT STATION 1+20



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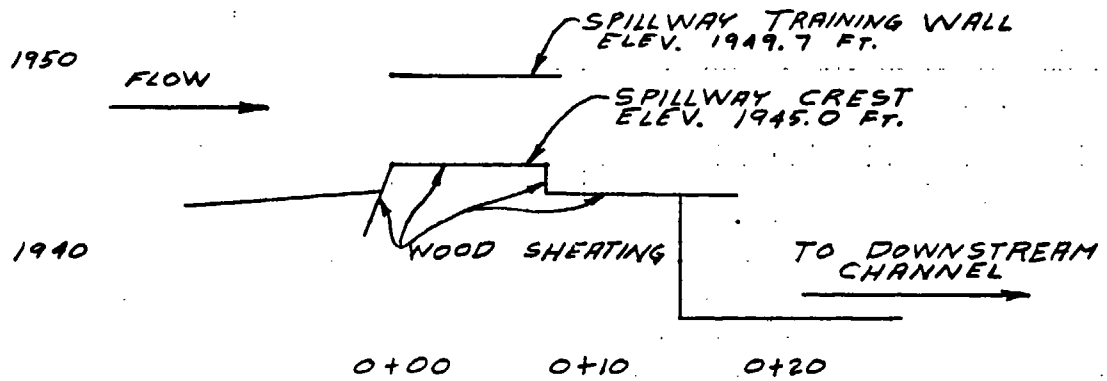
Subject HATHAWAY POND DAM S.O. No.
SPILLWAY DISCHARGE RATING Sheet No. 5 of 8
Drawing No.
Computed by GWT Checked by WDL Date 11-24-80

SPILLWAY PROFILE



DEVELOPE RATING CURVE BASED UPON CRITICAL FLOW OVER SPILLWAY:

$V = \sqrt{gD}$ (CHOW, OPEN CHANNEL HYDRAULICS, P. 43)

D = MEAN HYDRAULIC DEPTH = $\frac{\text{FLOW AREA}}{\text{FREE SURFACE TOP WIDTH}} = \frac{A}{T}$

g = 32.2 FT/SEC²

V = MEAN FLOW VELOCITY

$Q = VA$

SPILLWAY ELEV., FT.	FLOW DEPTH, FT.	AREA, FT²	TOP WIDTH, FT.	A/T	V, FT/SEC.	Q, CFS	V²/2g	RESERVOIR SURFACE, FT.
1945.0	0	0	0	0	0	0	0	1945.00
1945.3	0.3	4.20	28.0	0.15	2.19	9.20	0.07	1945.37
1946.0	1.0	24.04	28.7	0.83	5.17	124.27	0.41	1946.41
1946.5	1.5	38.57	29.4	1.31	6.49	250.32	0.65	1947.15
1947.0	2.0	53.44	30.1	1.77	7.55	403.47	0.88	1947.88
1947.5	2.5	68.64	30.7	2.23	8.47	581.38	1.11	1948.61
1948.0	3.0	84.17	31.4	2.68	9.29	781.94	1.34	1949.34
1948.5	3.5	100.04	32.1	3.11	10.01	1001.40	1.55	1950.05
1949.0	4.0	116.27	32.8	3.54	10.68	1,241.76	1.77	1950.77
1949.7	4.7	139.47	33.5	4.16	11.57	1,613.67	2.08	1951.78
1950.0	5.0	149.52	33.5	4.46	11.98	1,791.25	2.23	1952.23
1951.0	6.0	183.02	33.5	5.46	13.26	2,426.85	2.73	1953.73
1952.0	7.0	216.52	33.5	6.46	14.42	3,122.22	3.23	1955.23

SPILLWAY CAPACITY AT THE MINIMUM TOP OF THE DAM (ELEV. 1948.9 FT.) IS 666 CFS.

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Beaver, Pa. 15009

Subject: HATHAWAY POND — S.O. No.
100-YEAR DISCHARGE CALCULATIONS — Sheet No. 6 of 8
Drawing No.
Computed by GWT — Checked by WDV — Date 5/15/81

THE INFLOW TO THE IMPOUNDMENT FOR THE 100-YEAR FLOOD WAS CALCULATED USING MATERIAL FROM "THE HYDROLOGIC STUDY - TROPICAL STORM AGNES" PREPARED BY THE SPECIAL STUDIES BRANCH, PLANNING DIVISION, NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS, IN NEW YORK CITY.

DRAINAGE AREA - 1.92 Sq. Mi.

① COMPUTE THE MEAN LOGARITHM

$\log (Q_m) = C_m + 0.75 \log A$

$\log (Q_m)$ = MEAN LOGARITHM OF ANNUAL FLOOD PEAKS
A = DRAINAGE AREA, SQ. MI. - 1.92
C_m = MAP COEFFICIENTS FOR MEAN LOG OF ANNUAL PEAKS FROM FIG. 21 - 2.15

$\log (Q_m) = 2.15 + 0.75 (\log 1.92)$
$= 2.3625$

② COMPUTE STANDARD DEVIATION

$S = C_s - 0.05 (\log A)$

S = STANDARD DEVIATION OF THE LOGARITHMS OF THE ANNUAL PEAKS.
C_s = MAP COEFFICIENT FOR STANDARD DEVIATION FROM FIG. 22 = 0.341
A = DRAINAGE AREA, SQ. MI., = 1.92

$S = 0.341 - 0.05 (\log 1.92)$
$= 0.3268$

③ SELECT SKEW COEFFICIENT FROM FIG. 23 = 0.16

④ $\log (Q_{100}) = \log (Q_m) + K(P,g) S$

K (P,g) = STANDARD DEVIATE FOR A GIVEN EXCEEDENCE FREQUENCY PERCENTAGE (P) AND SKEW COEFFICIENT (g) FROM EXHIBIT 39 OF BEARD'S "STATISTICAL METHODS IN HYDROLOGY" 2.45

$\log (Q_{100}) = 2.3625 + 2.45 (0.3268)$
$Q_{100} = 1,456$ CFS

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Subject HATHAWAY POND S.O. No.
100-YEAR DISCHARGE CALCULATION Sheet No. 7 of 8
Drawing No.
Computed by GWT Checked by WDL Date 6/19/81

THE INFLOW TO THE IMPOUNDMENT FOR THE 100-YEAR FLOOD WAS CALCULATED USING MATERIAL FROM "WATER RESOURCES BULLETIN, BULLETIN NO. 13, FLOODS IN PENNSYLVANIA", PREPARED BY THE DEPARTMENT OF ENVIRONMENTAL RESOURCES, COMMONWEALTH OF PENNSYLVANIA.

DRAINAGE BASIN FROM PLATE 1 – MODEL 5

REGRESSION EQUATION FROM TABLE 5

$Q_T = cA^x P_i^p$

T = 100 YEARS
C = 42.2
A = DRAINAGE AREA, 1.92 Sq. Mi.
X = 0.751
P_i = 44.0

$Q_{100} = 42.2(1.92)^{.751}(44.5-23.6)$

$Q_{100} = 1439.5$ C.F.S.

AVERAGING THE INFLOW FROM THIS METHOD AND THE PREVIOUS METHOD GIVES AN INFLOW OF 1448 C.F.S. TO THE IMPOUNDMENT.

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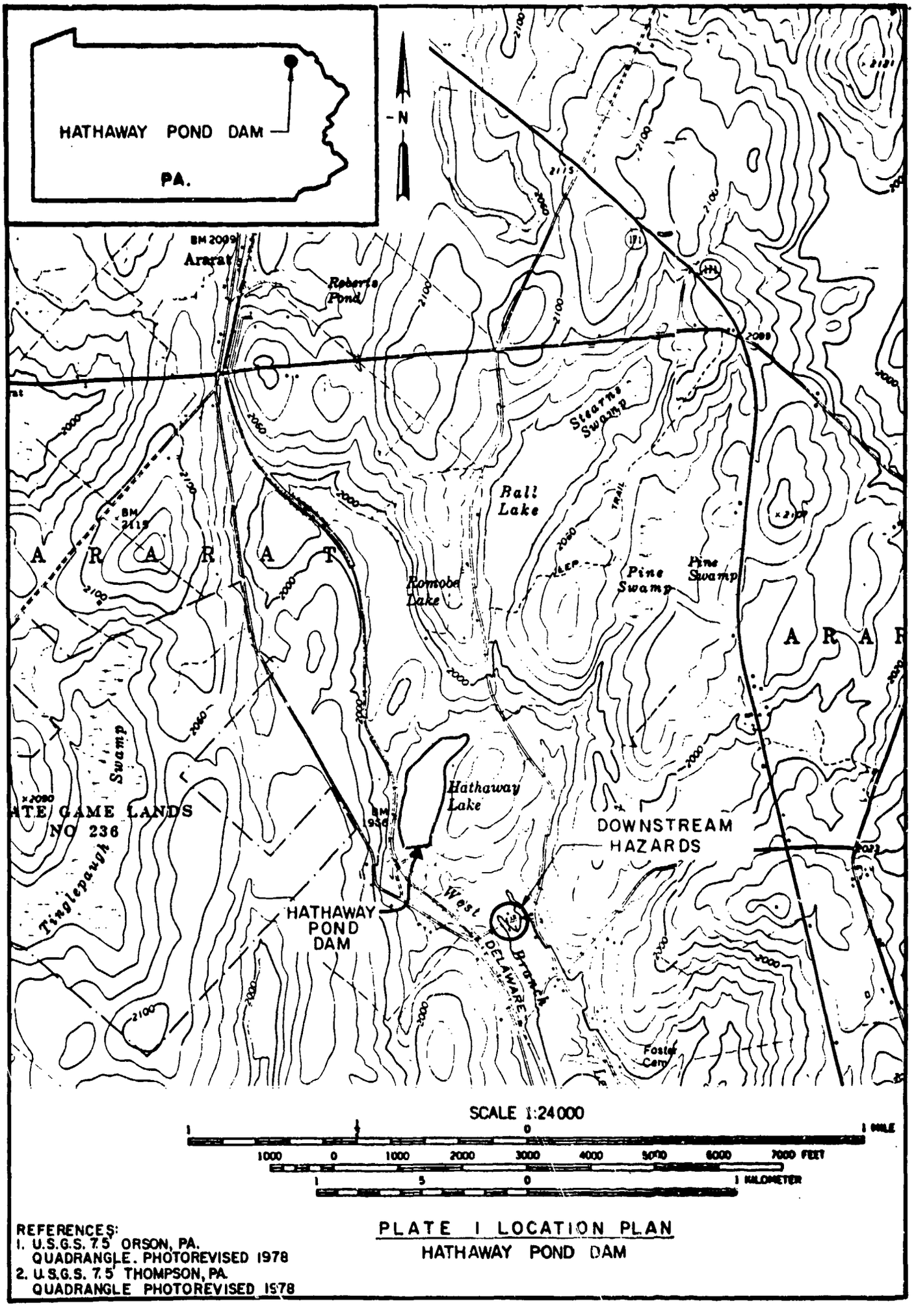
Subject HATHAWAY POND DAM — S.O. No.
SUMMARY — Sheet No. 8 of 8
Drawing No.
Computed by GWT — Checked by WDL — Date 4/9/81

NAME	LENGTH OF DAM	HEIGHT OF DAM	NORMAL POOL STORAGE	TOP OF DAM STORAGE
HATHAWAY POND DAM	160 FT.	14.8 FT.	145 AC-FT 1945.0 FT	251 AC-FT 1948.9 FT
ROMOBE LAKE DAM	74 FT.	7.7 FT.	162 AC-FT 1969.1 FT.	195 AC-FT 1970.0 FT
BALL LAKE DAM	70 FT.	5.0 FT.	66 AC-FT 2005.0 FT.	66 AC-FT 2005.0 FT

APPENDIX E

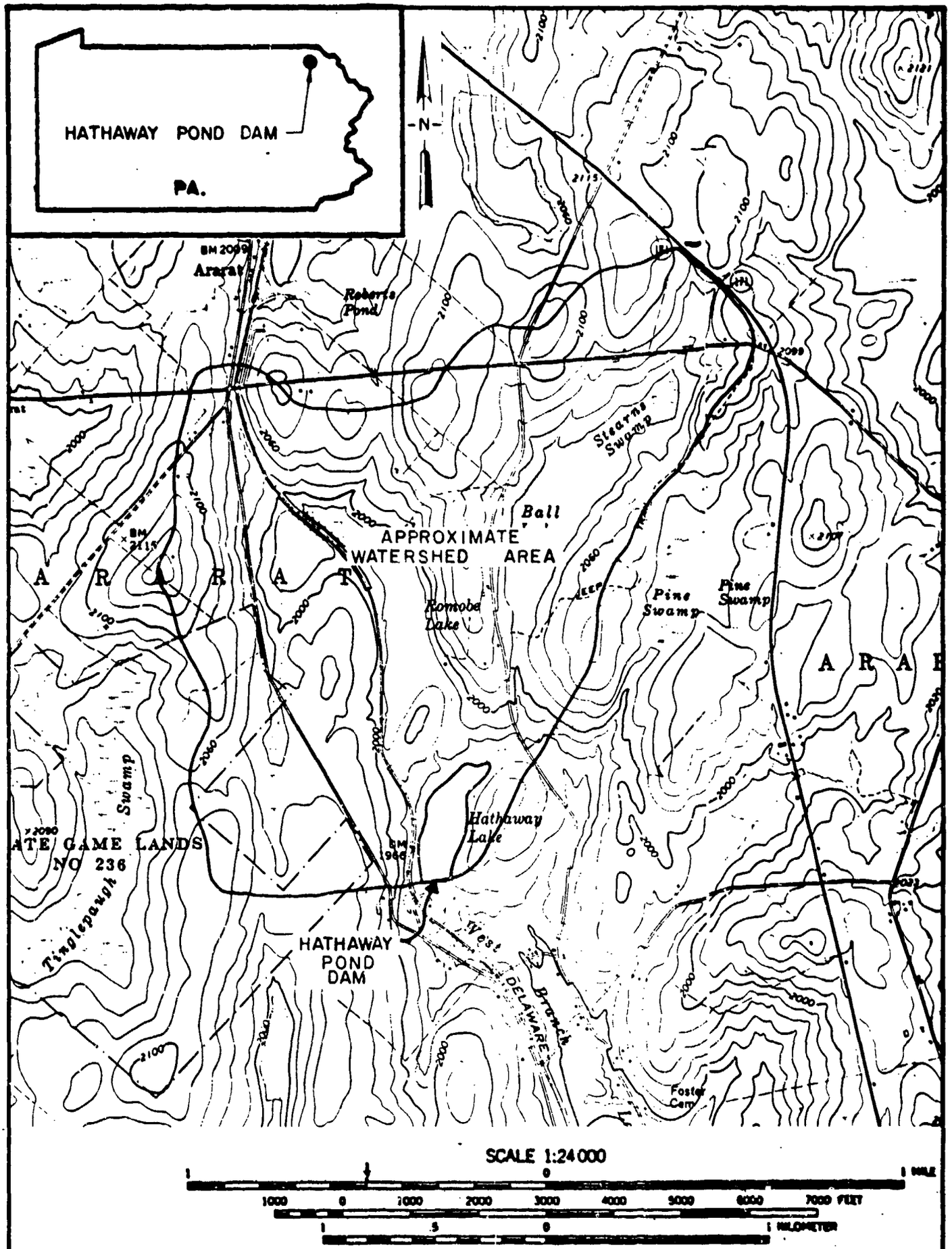
PLATES

CONTENTS



REFERENCES:
1. U.S.G.S. 7.5' ORSON, PA. QUADRANGLE. PHOTOREVISED 1978
2. U.S.G.S. 7.5' THOMPSON, PA. QUADRANGLE PHOTOREVISED 1978

PLATE I LOCATION PLAN
HATHAWAY POND DAM



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1. U.S.G.S. 7.5' ORSON, PA. QUADRANGLE. PHOTOREVISED 1978
2. U.S.G.S. 7.5' THOMPSON, PA. QUADRANGLE PHOTOREVISED 1978

PLATE 2 WATERSHED MAP

HATHAWAY POND DAM

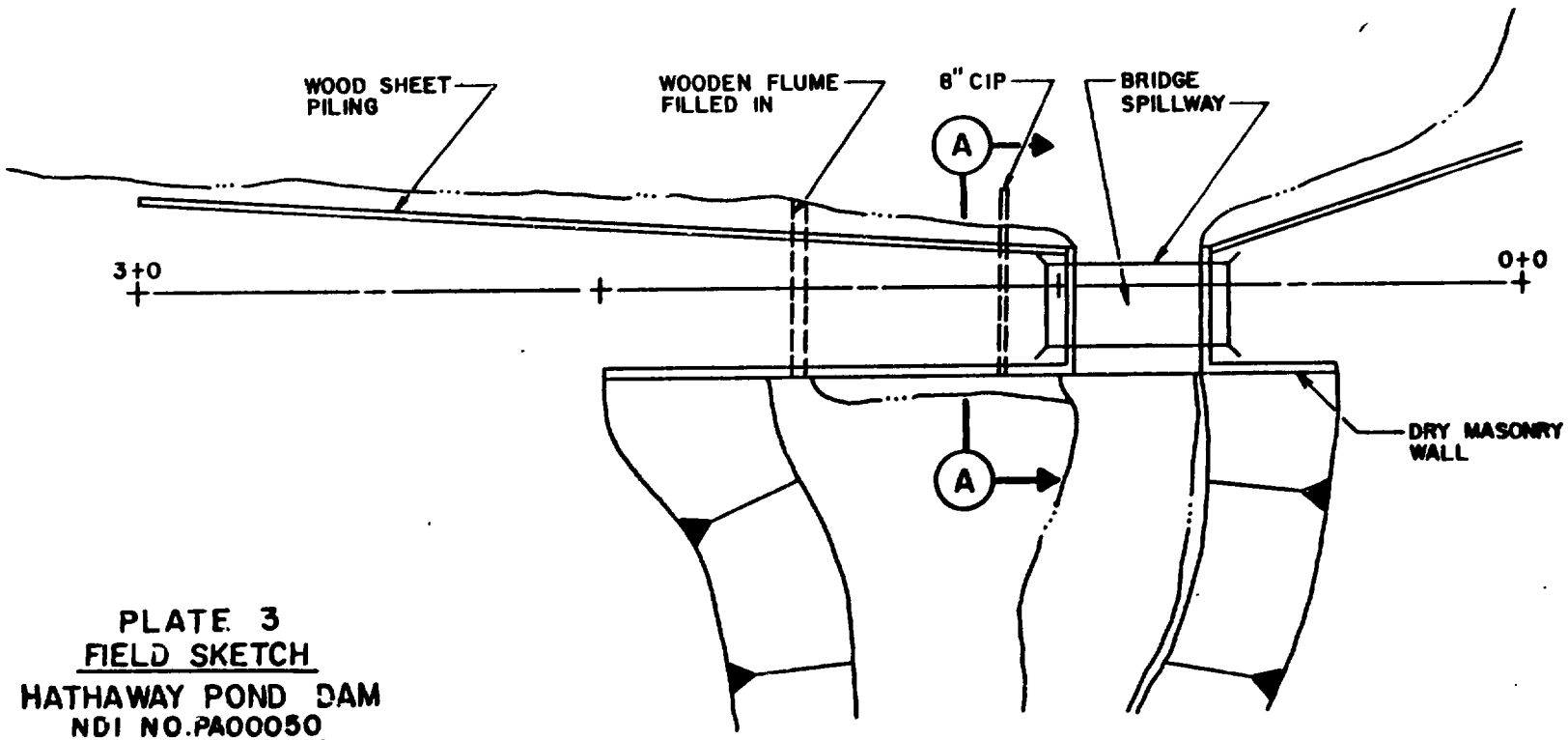

PLATE 3
FIELD SKETCH
HATHAWAY POND DAM
NDI NO. PA00050
Penn DER NO. 58-06
SCHEMATIC - NOT TO SCALE

CROSS SECTION TAKEN AT STA. 1+20

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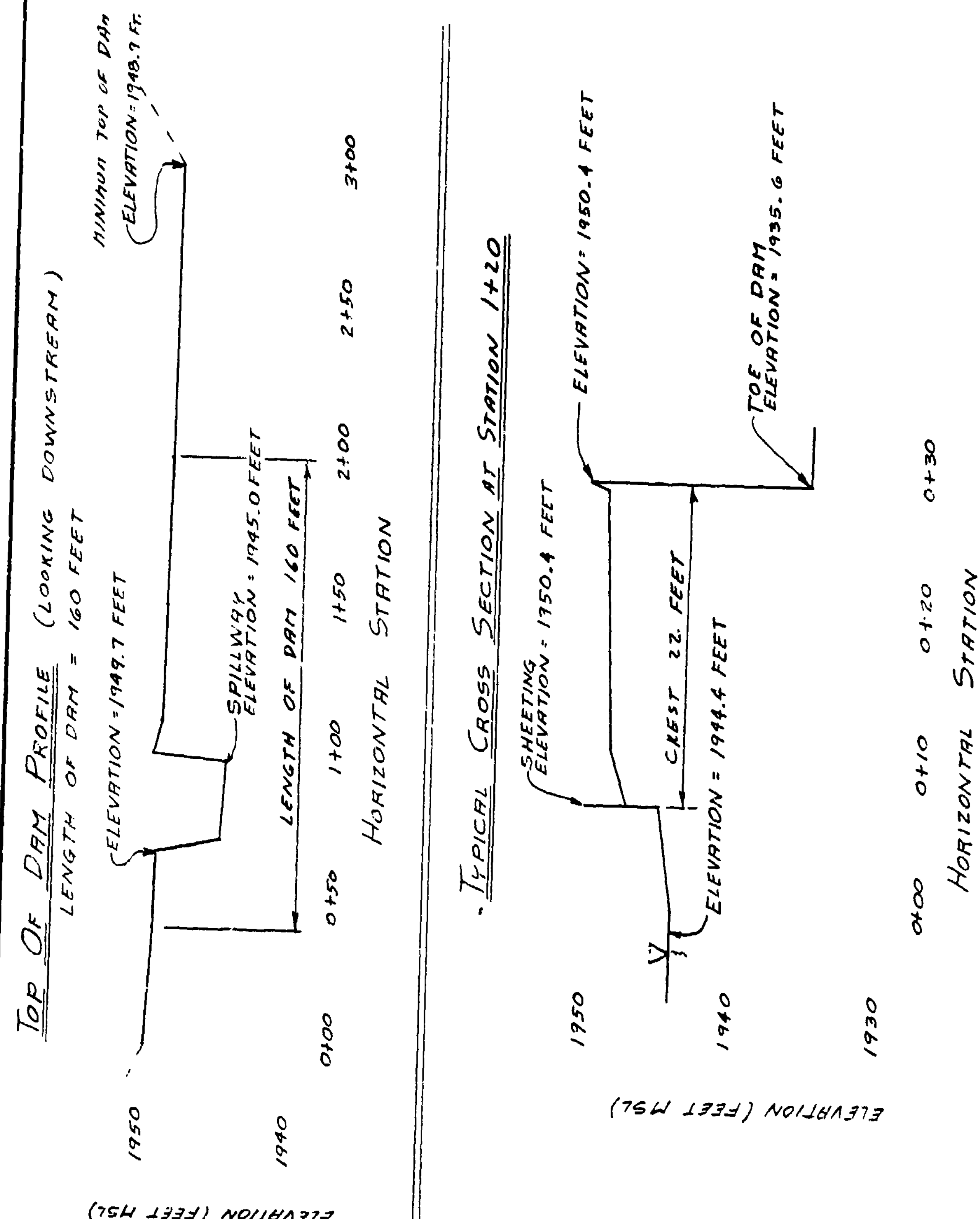
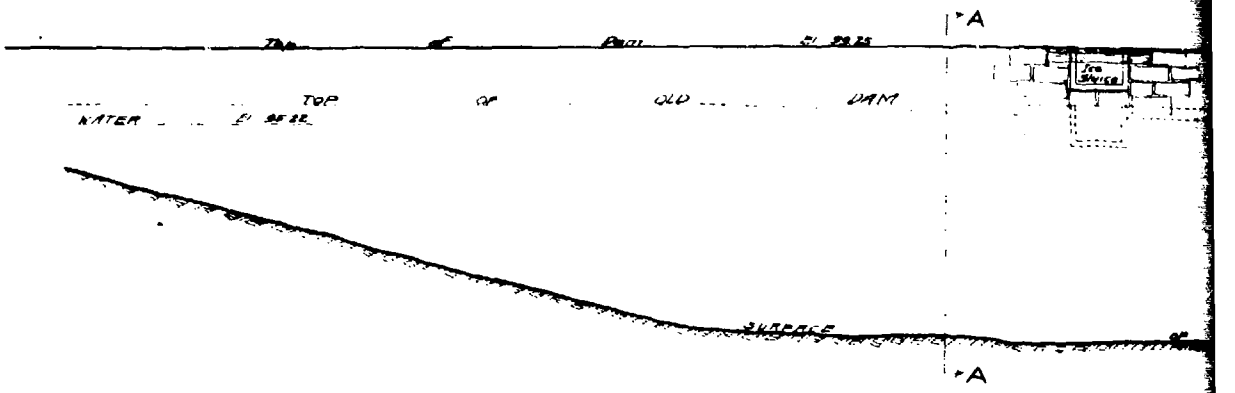
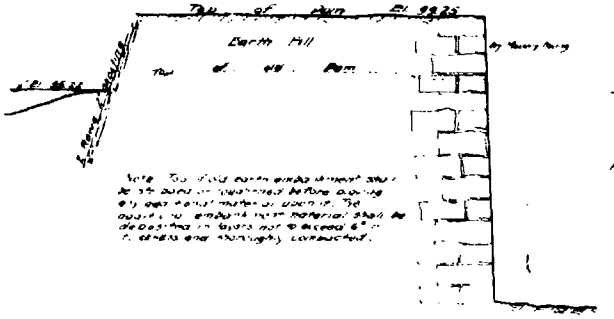
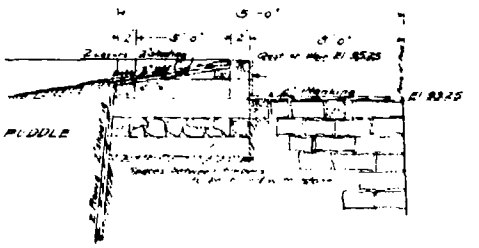


PLATE 4





SECTION AA.



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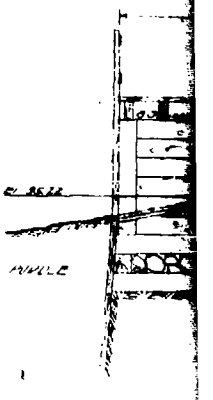

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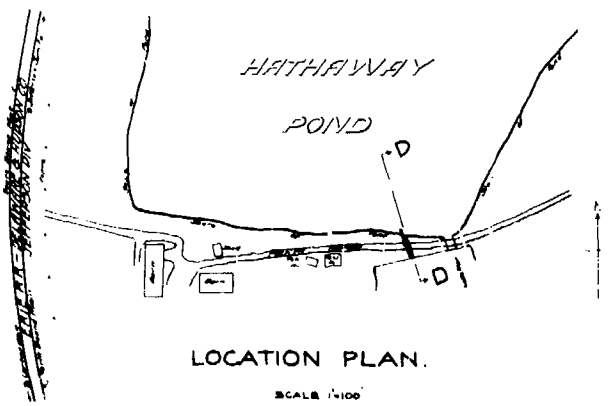
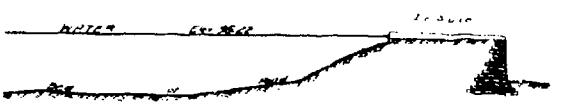


LOCATION PLAN.

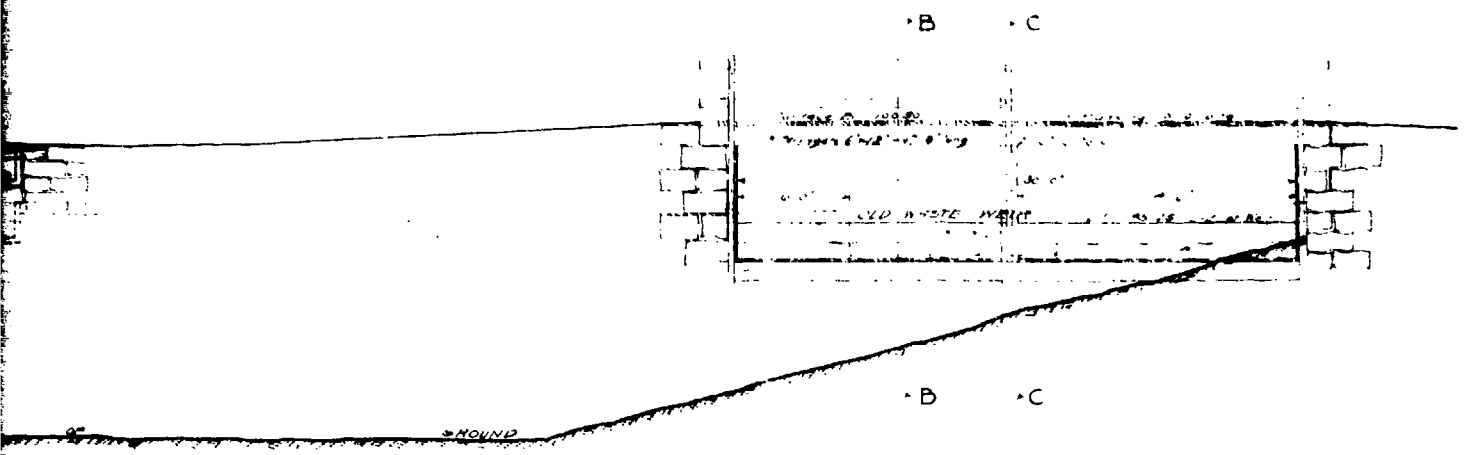
SCALE 1"=100'



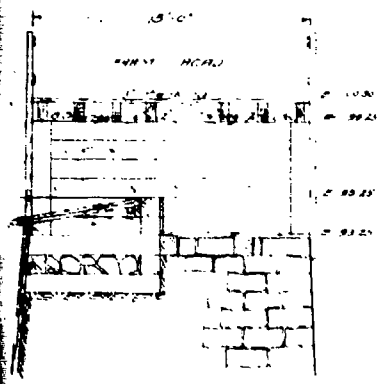
SECTION DD.

SCALE 1"=20'

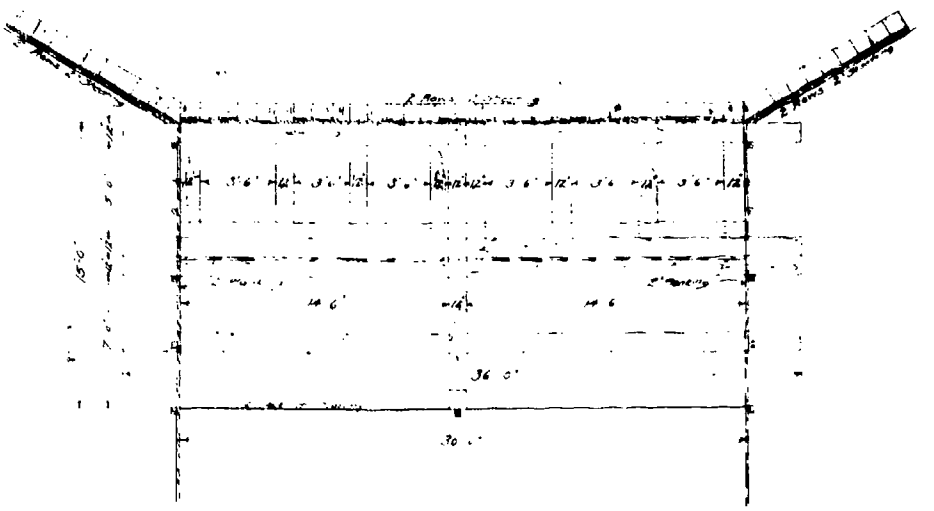
LON



ELEVATION.



SECTION CC.



PLAN SHOWING UNDERFRAME

LONGITUDINAL SECTION OF FLUME.

CROSS SECTION OF FLUME.

ERIE RAILROAD CO.
JEFFERSON DIVISION.
DELAWARE & HUDSON C
PENNSYLVANIA DIVISION
Proposed Changes on
Hathaway Pond 2 Miles
ARARAT P
Office of Asst. Engineer
Wilkes-Barre Pa.
476

Approved

PLATE - 5

APPENDIX F

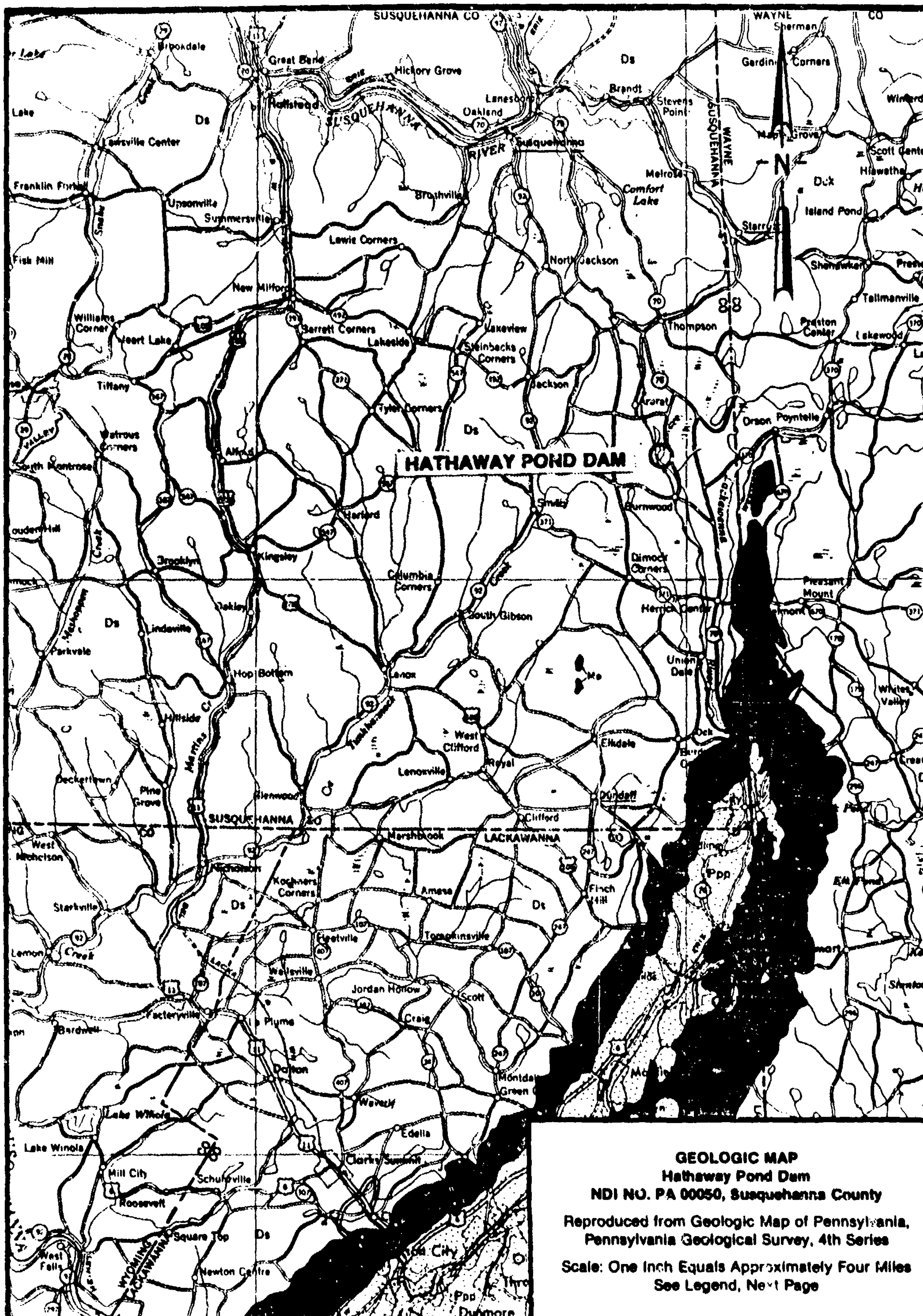
REGIONAL GEOLOGY

Hathaway Pond Dam
NDI No. PA 00050, PennDER No. 58-06

REGIONAL GEOLOGY

Hathaway Pond Dam is located in the Glaciated Low Plateaus section of the Appalachian Plateaus physiographic province. Drainage is to the south via the Lackawanna River, and relief averages 300 feet in the area. The area has been glaciated at least three times and is presently covered with Wisconsin Stage glacial deposits. According to the Soil Conservation Service's Soil Survey for Susquehanna County, surface soils in the vicinity of the dam consist primarily of flaggy silt loams of the Morris-Wellsboro association. No test borings were available for review; thus, the thickness of this overburden is difficult to ascertain.

Geologic references indicate that the bedrock underlying the dam consists of members of the Catskill formation in the Susquehanna Group. The Catskill formation is composed of bay and prodelta (red and gray), shales, and sandstones of Upper Devonian age, but may contain scattered, thin coal seams and scattered fish remains. The strata remains essentially horizontal after the Appalachian Uplift.



GEOLOGIC MAP
Hathaway Pond Dam
NDI NO. PA 00050, Susquehanna County

Reproduced from Geologic Map of Pennsylvania, Pennsylvania Geological Survey, 4th Series

Scale: One Inch Equals Approximately Four Miles
See Legend, Next Page

GEOLOGY MAP LEGEND

DEVONIAN

UPPER

WESTERN PENNSYLVANIA

Oswayo Formation
Greenish gray to gray shales, siltstones and sandstones becoming increasingly shaly westward; considered equivalent to type Oswayo. Riceville Formation Dr in Erie and Crawford Counties; probably not distinguishable north of Corry.

Cattaraugus Formation
Red, gray and brown shale and sandstone with the proportion of red decreasing westward; includes Venango sands of drillers and Salamanca sandstone and conglomerate; some limestone in Crawford and Erie counties.

Conneaut Group
Alternating gray, brown, greenish and purplish shales and siltstones; includes "pink rock" of drillers and "Chemung" and "Girard" Formations of northwestern Pennsylvania.

Canadaway Formation
Alternating brown shales and sandstones; includes "Portage" Formation of northwestern Pennsylvania.

CENTRAL AND EASTERN PENNSYLVANIA

Oswayo Formation
Brownish and greenish gray, fine and medium grained sandstones with some shales and scattered calcareous lenses; includes red shales which become more numerous eastward. Relation to type Oswayo not proved.

Catskill Formation
Chiefly red to brownish shales and sandstones; includes gray and greenish sandstone tongues named Elk Mountain, Honesdale, Shohola, and Delaware River in the east.

Marine beds
Gray to olive brown shales, graywackes, and sandstones; contains "Chemung" beds and "Portage" beds including Burket, Mallter, Harrell, and Trimmers Rock; Tully Limestone at base.

Susquehanna Group
Barbed line is "Chemung-Catskill" contact of Second Pennsylvania Survey County reports; barbs on "Chemung" side of line.

MIDDLE AND LOWER

Hamilton Group

Mahantango Formation
Brown to olive shale with interbedded sandstones which are dominant in places (Montebello); highly fossiliferous in upper part; contains "Centerfield coral bed" in eastern Pennsylvania.

Marcellus Formation
Black, fissile, carbunaceous shale with thick, brown sandstone (Turkey Ridge) in parts of central Pennsylvania.

Onondaga Formation
Greenish blue, thin bedded shale and dark blue to black, medium bedded limestone with shale predominant in most places; includes Selinsgrove Limestone and Needmore Shale in central Pennsylvania and Buttermilk Falls Limestone and Esopus Shale in easternmost Pennsylvania; in Lehigh Gap area includes Palmerton Sandstone and Bowmanstown Chert.

Oriskany Formation
White to brown, fine to coarse grained, partly calcareous, locally conglomeratic, fossiliferous sandstone (Ridgeley) at the top; dark gray, cherty limestone with some interbedded shales and sandstones below (Shriver).

Helderberg Formation
Dark gray, calcareous, thin bedded shale (Mandata) at the top, equivalent to Port Ewen Shale and Becraft Limestone in the east, dark gray, cherty, thin bedded, fossiliferous limestone (New Scotland) with some local sandstones in the middle; and, at the base dark grey, medium to thick bedded, crystalline limestone (Coeymans), sandy and shaly in places with some chert nodules.